

ABSTRACT OF THE DISCLOSURE

Self-organized, or self-assembled, nanowires of a first composition may be used as an etching mask for fabrication of nanowires of a second composition. The method for forming such nanowires comprises: (a) providing an etchable layer of the second composition and having a buried insulating layer beneath a major surface thereof; (b) growing self-assembled nanowires on the surface of the etchable layer; and (c) etching the etchable layer anisotropically down to the insulating layer, using the self-assembled nanowires as a mask. The self-assembled nanowires may be removed or left. In either event, nanowires of the second composition are formed. The method enables the formation of one-dimensional crystalline nanowires with widths and heights at the nanometer scale, and lengths at the micrometer scale, which are aligned along certain crystallographic directions with high crystal quality. Further, the method of the present invention avoids traditional lithography methods, minimizes environmental toxic chemicals usage, simplifies the manufacturing processes, and allows the formation of high-quality one-dimensional nanowires over large areas.